Conservation Assessment
for
Mystery Vertigo (Vertigo paradoxa)

USDA Forest Service, Eastern Region

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This Conservation Assessment was prepared to compile the published and unpublished information on the subject taxon or community; or this document was prepared by another organization and provides information to serve as a Conservation Assessment for the Eastern Region of the Forest Service. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject taxon, please contact the Eastern Region of the Forest Service - Threatened and Endangered Species Program at 310 Wisconsin Avenue, Suite 580 Milwaukee, Wisconsin 53203.

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EXECUTIVE SUMMARY

This is a draft Conservation Assessment providing a summary of readily available information on the distribution, ecology, habitat and population biology of *Vertigo paradoxa*, a terrestrial snail, in the Great Lake States. This document was compiled to assist in writing of the Conservation Assessment for the Niagara Escarpment Community.

Vertigo paradoxa and eight additional species including *Vertigo morsei* and *Catinella exile* are among the most restricted animal taxa in North America and have been recommended for Federal endangered species Protection (Nekola 1997) based on its limited U.S. distribution (Nekola 1998b).

Vertigo paradoxa is not listed on the state Threatened and Endangered List or for any state in the Great Lakes region.

Threats to this species include habitat modifications such as timber harvesting, mining, grazing or any other activities that decrease floral diversity. Opening the canopy can change the microclimate of a site and result in desiccation. Other threats to individual populations include fire suppression, recreation area developments such as trail construction and maintenance, picnic area construction, road construction and maintenance activities, road salting, wetland improvement projects such as certain types of stream improvement, pond construction and dredging and noxious weed treatment (NatureServe 2000). Human disturbance from recreation along high use hiking trails at the base of cliffs (Nekola 1996) and ATV use (Nekola 1998b) also threaten habitat for land snails. In Nekola's 1998 inventory of this species in the Upper Peninsula of Michigan, quarrying and human disturbance (use as a partying location) were named as threats to habitat of this species (Nekola 1998b). Acid rain may be a threat to this species (D. Cuthrell, personal communication 2001).

Research needs include life history and population viability of the species.

ACKNOWLEDGEMENTS

Information was provided by the following individuals: Dr. Michael Hoggarth, Associate Professor and Chair, Department of Life and Earth Sciences, Otterbein College, Westerville Ohio; Dave Cutthrell, Associate Program Leader, Michigan Natural Heritage Program; Daryl Howell, State of Iowa, Department of Natural Resources; and Laura Hutchinson, Library Services Leader, North Central Research Station in St. Paul Minnesota conducted a literature search on this species. Julie Williams compiled the State Endangered, Threatened and Sensitive Species lists for the majority of the states within the continental U.S. and Canadian provinces.

NOMENCLATURE AND TAXONOMY

Scientific name: *Vertigo paradoxa* (Sterki, 1900)

Subspecies:

Common name:

Order: Stylommatophora

Family: Pupillidae

Synonym (s): No synonym.

DESCRIPTION OF SPECIES

This species has a shell measuring 1.75 mm in height and 1 mm wide (Nekola 1998b). *Vertigo paradoxa* differs from *V. iowaensis* and *V. brierensis* by having a shallow depression over the lower palatial lamella and shorter palatial lamella which do not deeply enter into the aperture (Nekola 1998b) and by descriptions given by Frest (1991), may differ from *V. brierensis* by having taller columellar lamella.

LIFE HISTORY

Not documented.

HABITAT

Habitat for this species has been described as leaf litter in upland woods (M. Hoggarth personal communication 2001). In the eastern Upper Peninsula of Michigan this species was most often found in association with carbonate outcrops and near Lake Superior from basalt outcrops (Nekola 1998b). Overstory vegetation most often associated with limestone cliffs sites with occurrences of this species are, but not limited to: *Thuja occidentalis, Acer saccharum, Tsuga canadensis* and either *Betula lutea* or *B. papyrifera* and occasionally *Pinus strobus*. Ground cover included *Carex spp.*, and ferns, *Cryptogramma stelleri* and *Polystichum braunii* (Nekola 1998b). The fern *Polypodium vulgare* was found in association with basalt sites on the Keeweenaw peninsula (Nekola 1998b).

DISTRIBUTION AND ABUNDANCE

Rangewide/Regionwide

Vertigo paradoxa has been found in Newfoundland (M. Hoggarth personal communication 2001), Maine, Michigan, Ontario (M. Hoggarth personal communication 2001, NatureServe 2000), South Dakota, Wisconsin, and Wyoming (NatureServe 2000). Fossil remains of this species were found in Kansas and Nebraska (NatureServe 2000, Nekola 1998b). Based on habitat requirements, areas that are most likely to be inhabited in the United States are northern sections and extreme northeastern states. These areas have been extensively surveyed and new occurrences are unlikely to be found (NatureServe 2000). In Canada, this species was found from far northwestern Ontario to James Bay and Lake Ontario to Newfoundland (Nekola 1998b).

Status in the Great Lakes Region

Table 1. *State Ranks for Vertigo paradoxa*

State	State Threatened/Endangered or Special Concern Listing	State/Province Heritage Status Ranks
Illinois	Not listed as T/E or Special Concern	Not ranked
Indiana	Not listed as T/E or Special Concern	Not ranked
Michigan	Not listed as T/E or Special Concern	S3, Suggested status is Special Concern (Nekola 1998b).
Minnesota	Not listed as T/E or Special Concern	Not ranked
New York	Not listed as T/E or Special Concern	Not ranked
Ohio	Not listed as T/E or Special Concern	Not ranked
Ontario	Not listed as T/E or Special Concern	S2S3
Pennsylvania	Not listed as T/E or Special Concern	Not ranked
Wisconsin	Not listed as T/E or Special Concern	S1

State Ranks: **S1**=critically imperiled; extreme rarity or because of some factor of its biology making it especially vulnerable to extirpation from the state. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).

S2= Imperiled: rarity or because of other factors making it very vulnerable to extirpation from the state. Typically 6 to 20 occurrences or few remaining individuals (1,000-3,000). S2S3 is between S2 and S3.

S3=Vulnerable; rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 to 10,000 individuals. S? denotes not enough information is available to rank.

The global rank G3 was assigned October 8, 2002 (Nature Serve 2002). Prior to the 1998 ranking, this species was ranked as a G4 in 1995 (TNC 1998). The current rounded global heritage status rank is G3.

G3=rare to uncommon; usually between 20 to 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. G3 was assigned because this species is known from only seven United States locations, but could occur more extensively in Canada. Distribution is widespread but very local; abundance is apparently low (NatureServe 2001).

In addition to the State ranks listed in Table 1, *Vertigo paradoxa* has a state rank of S? in Maine and is listed a species of Special Concern; S1 in South Dakota and S? in Wyoming (NatureServe 2000). State status information was not located for Alaska, Florida, Georgia, Idaho, Kansas, Kentucky, Maryland, New Hampshire, New Jersey, North Carolina, Rhode Island, Tennessee, Texas and West Virginia.

Table 2. *Vertigo paradoxa Occurrence in the GreatLake States by County, State and Year**

State	County of Occurrence	Number of Occurrences and Year
Illinois	Not tracked by Natural Heritage in this state.	
Indiana	Not tracked by Natural Heritage in this state.	
Michigan	Cheboygan County Chippewa County Delta County Gogebic County Keweenaw County Mackinac County Ontonagon County Schoolcraft County	1 occurrence (NatureServe 2001). 7 occurrences. 1 occurrence. 1 occurrence. 8 occurrences. 1 occurrence. 1 occurrence. 2 occurrences. Occurrences are from Nekola 1998b unless noted otherwise. This species is not tracked by the Michigan Natural Heritage Program.
Minnesota	Not tracked by Natural Heritage in this state.	
New York	Not tracked by Natural Heritage in this state.	
Ohio	Not tracked by Natural Heritage in this state.	
Ontario	Found at 14 stations along the Niagaran Escarpment in southern Ontario (Nekola	Not tracked by Natural Heritage in this province.

	1998b).	
Pennsylvania	Not tracked by Natural Heritage in this state.	
Wisconsin	Found at 9 stations in northern Wisconsin (Nekola 1998b).	Not tracked by Natural Heritage in this state.

County occurrence information from Michigan Natural Features Inventory, Michigan County Element List-September 1999, Wisconsin Natural Heritage Program, Rare Species and Natural Communities, NHI Working List by County, Indiana Natural Heritage Data Center, List of Endangered, Threatened , and Rare Species by County, November 16, 1999, Ontario Natural Heritage Information Centre, Rare Species Query by County query ran 1/9/01.

Also occurrences have been located at five sites (Nekola 1998b) in Crook County Wyoming and Lawrence and Pennington counties in South Dakota (NatureServe 2000) and two counties in eastern Maine (Nekola 1998b).

POPULATION BIOLOGY AND VIABILITY

Not documented.

POTENTIAL THREATS AND MONITORING

Present or Threatened Risks to Habitat or Range

Threats to this species include habitat modifications such as timber harvesting, mining, grazing or any other activities that decrease floral diversity. Opening the canopy can change the microclimate of a site and result in desiccation. Other threats to individual populations include fire suppression, recreation area developments such as trail construction and maintenance, picnic area construction, road construction and maintenance activities, road salting, wetland improvement projects such as certain types of stream improvement, pond construction and dredging and noxious weed treatment (NatureServe 2000). Human disturbance from recreation along high use hiking trails at the base of cliffs (Nekola and Frest 1996) and ATV use (Nekola 1998b) also threaten habitat for land snails. In Nekola's 1998 inventory of this species in the Upper Peninsula of Michigan, quarrying and human disturbance (use as a partying location) were named as threats to habitat of this species (Nekola 1998b). Acid rain may be a threat to this species (D. Cuthrell, pers. comm. 2001).

Threats to other *Vertigo* species may also threaten this species: filling of upland sink holes with trash or soil, discharge of agricultural pollutants, road building, quarrying, spelunking or rock climbing (Frest 1991).

Table 3. *Threats or Risks to Vertigo paradoxa and Its Habitat by Forest*

Forest	Risk or Threat
Chequamegon-Nicolet	Not on RF Sensitive Species list for the Cheq-Nicolet.
Chippewa	Not on RF Sensitive Species list for the Chippewa.
Hiawatha	Nekola (1998b) recommended the Maple Hill site be protected from timber and recreation activities. This site represents the best example of carbonate cliff habitat in the Eastern U.P. and has the richest land snail fauna of any inventoried site (Nekola 1998b). The Kenneth Road site is recommended to be protected from timber management, it is the best example of limestone cliff in Mackinac County (Nekola 1998b). Other threats to habitat on Forest are quarrying, site being used by locals as a party spot, needs enforcement.
Huron-Manistee	Not on RF Sensitive Species list for the Huron-Manistee.
Ottawa	Not on RF Sensitive Species list for the Ottawa.
Superior	Not on RF Sensitive Species list for the Superior.

NatureServe (2000) lists this species as occurring in the Black Hills National Forest in South Dakota.

Commercial, Recreational, Scientific or Educational Overutilization

Frest 1991 listed collecting and research pressure on the more fragile sites as threats of other species of *Vertigo*, it may be the same for this individual species.

Disease or Predation

This species are too small to be preyed upon by mammals (D. Cuthrell personal communication 2001).

Inadequacy of Existing Regulatory Mechanisms

None documented.

Other Natural or Human Factors Affecting Continued Existence of Species

None documented.

SUMMARY OF LAND OWNERSHIP AND EXISTING HABITAT PROTECTION

Of the 21 locations this species was found in Nekola 1998b inventory, 3 site are on the Hiawatha National Forest. The three populations of *Vertigo paradoxa* occurring on the Hiawatha National Forest are all 100% Forest Service ownership. Ownership was not recorded at all sites (Nekola 1998b).

SUMMARY OF EXISTING MANAGEMENT ACTIVITIES

See recommendations in Table 3 for specific sites on the Hiawatha National Forest.

PAST AND CURRENT CONSERVATION ACTIVITIES

None known.

RESEARCH AND MONITORING

Morphometric analysis of *Vertigo paradoxa* and *V. brierensis* may show these two species may not be specifically distinct (Nekola 1998b).

The National Biological Information Infrastructure (NBII) was searched for this species at http://search.usgs.gov/nbii/query, no documents were found. The *Vertigo paradoxa* query at North Central Research Station found no information.

Existing Surveys, Monitoring and Research

Dr. Jeffery Nekola, University of Wisconsin Green Bay conducted a study: Terrestrial Gastropod Inventory of the Niagaran Escarpment and Keweenaw Volcanic Belt in Michigan's Upper Peninsula in 1998. In this inventory no effort was made to differentiate *V. brierensis* from V. *paradoxa* as no reliable characteristics have been published to distinguish them (Nekola 1998b).

Vertigo paradoxa was listed incorrectly as *V. arthuri* in the 1994 U.S. Fish and Wildlife Service Candidate Review (NatureServe 2001).

Survey Protocol

Samples are collected from various habitats, larger land snails are collected by hand and placed in plastic snap vials. Four liter litter samples are used to collect smaller taxa. At woodland sites, concentrate collections at places of abundance of larger snails, along the base of cliffs, rocks, trees, soil covering ledges or at microclimates such as cold air vents on a cliff face. In open sites collect small blocks of turf (ca 125 cm3) or loose soil and leaf litter accumulations under or adjacent to cobbles, boulders or shrubs (Nekola 1998b) or from hummock sides, undisturbed places or swales (Nekola and Ferest 1996). Samples could also

be taken under shrubs (Nekola and Frest 1996). At the lab, use a low-temperature soil oven to slowly and completely dry the samples. Once dry, soak the samples in water for 3-24 hours and sieve. Use a neutral-brown background, binocular microscope and sable brush to separate shells for identification (Nekola 1998b).

Research Priorities

Life history and population viability of the species.

REFERENCES

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LIST OF CONTACTS

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